Situation awareness in mixed realities

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Dirk Boerner, Stefaan Ternier, Marco Kalz
2005 OPEN UNIVERSITEIT, LEARNING MEDIA LAB, DEVELOPMENTS, MOBILE, IMMERSIVE, SOCIAL MEDIA
Feedback Loops and Situational Awareness
Usually I present this simplified Feedback Loop.
It integrates **Models for designing Technologies for learning**

**Actor**

- Experience Knowledge

**Behaviour**

- Monitoring / Assessment

**System**

- CELSTEC
  - celstec.org

**Response**

- Cognition
  - Butler & Winne (1995)
  - Endsley (2000)

**Judgement Reflection**

- Technologies
  - Zimmermann, Specht, & Lorenz (2005)
#display technology can create feedback loops...

Levels of Situation Awareness

• Level 1: Perception of relevant information
  – Being able to identify a situation

• Level 2: Comprehension of information
  – Understand the situation in context

• Level 3: Forward prediction
  – Understand the dynamics of a context
Individual Factors
- Goals & Objectives
- Preconditions
- Training
- Experience
- Abilities

Task/ System Factors
- System capabilities
- Stress & Workload
- Complexity
- Automation

Situational Awareness
- Perceive
- Comprehend
- Project

Information Processing Mechanisms
- Long term Memory
- Automacity

Perform

Decision
Situation Awareness in Teams

• Self-awareness within the team
• Peer-awareness within the team
• Awareness of the team as a whole
• Resource-awareness within the team
<table>
<thead>
<tr>
<th>SSA Maturity levels</th>
<th>Individual</th>
<th>Team/Group</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Flexibility</strong> to adapt and respond to unexpected situations [11]</td>
<td><strong>Synergy</strong> is a key ingredient for cooperative joint actions in dynamic environments [14]</td>
<td><strong>Innovation</strong> in processes, operations and technologies is essential to competitive. The system needs to be collectively innovative to deal with complex situations [19]</td>
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<tr>
<td><strong>Compliance</strong> to planning is crucial to prevent deviations that could affect others in the system. The gap between what an individual perceives and what he/she does needs to be reduced [1]</td>
<td><strong>Coordination</strong> is one of the key team processes required to create team SA [23]</td>
<td><strong>Network governance</strong> to monitor each others’ plans and actions, the system direction and to create a sense of communality and shared destiny [21], [25] &amp; [9] in [24]</td>
<td></td>
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<tr>
<td><strong>Goal orientation</strong> for individual goal setting [10]</td>
<td><strong>Team goal orientation</strong> for awareness of processes towards shared goal setting</td>
<td><strong>Positioning</strong> of a high level goal needs to be broad to allow negotiation, as well as steer the system in a direction [4]</td>
<td></td>
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</tbody>
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Reflection and Self-regulated learning
People reflect in order to learn.
The font size on this slide is 84. The font type is Gill Sans.

The absolute size of the screen is ....
effects of reflection


- reflection is not just an “add-on” to instruction, but an essential component of a deep approach to learning (Marton, Dall’Alba, & Beaty, 1993).
reflection amplifiers

- The confluence of experience (action) and thought (reflection) creates learning (e.g. Kolb, 1984 or Freire, 1973). Learning is both an active and a reflective process.
- Reflection amplifiers are aids designed to prompt and support clear and concise thought embedded within the process of learning.
Figure 1.1. Boud, Keogh, and Walker’s model of reflection (1985)
D. Schön’s ladder of reflection ...

Rung 1: Learning

Rung 2: Description of learning

Rung 3: Meaning of the description

Rung 4: Reflection on the dialogue
• **Reflection** is considered as a means by which learners can build and evolve a **mental model** of the learning process they are committed to and of their position inside this process (Seel, Al-Diban, & Blumschein, 2002), so that appropriate directions and actions can be procured.
Feedback and Self-regulated Learning


**Concepts of reflection**

- Reflection for action*
- Reflection in action
- Reflection on action

• Feedback loops are at the core of the learning cycle in TEL, different forms of feedback loops can be implemented

• Feedback aims at Situational Awareness, Reflection in and on Action, as also Behaviour Change

• This can happen in a self-regulated learning cycle including feedback and SA on different levels.
So what about augmented and mixed reality?
whitepaper online:
http://www.e-learningevent.nl/e-blog

youtube playlist:
http://www.youtube.com/playlist?list=PLA2A5852D66C31396

follow my blog for updates:
http://www.marcuspechtd.de

follow OpenU Topic Mobiel Leren
http://openu.nl
Mixed/Augmented Reality is about linking digital and real world artefacts based on context parameters.
concept
AICHE: Ambient Information Channels

http://www.designbynotion.com/metamirror-next-generation-tv/
mobile augmented reality for learning
mobile augmented reality for learning

concept
Interaction Patterns

HUD

http://www.peakfinder.org/
Tricorder
Holo chess
Interaction
HCI Patterns

X-Ray Vision
Different Modalities
Educational Patterns
3D Dynamic Objects

3D Models to visualize concepts of the learning content (Geometry, Math, Astrology, Engineering, Architecture)
Augmented Books

Enrich a book experience with augmented content, can be 3D Models or contextualized information.
RWO
Scanners, Proxy
Scan RWO for additional information, exploration driven.
Example: Language Learning
Sensor Based Layers

Present POI Information based on the current sensor information got from user device. Example: Wikitude
Collaborative Annotation

Shared digital annotations filtered by user context and following a learning logic. Example: Locatory.
• #1 ARLearn
• #2 weBuild
• #3 Mobile Reflection Amplifiers
• #4 Energy Awareness Displays
#3 CELSTEC: leren in context

- Augmented Reality Games,
- Excursions,
- Mixed Reality Games,
- Mobile Games and Simulations.

http://code.google.com/p/arlearn/

Authoring

Mobile App

StreetLearn
ARLearn Case studies

<table>
<thead>
<tr>
<th></th>
<th>Florence case</th>
<th>Amsterdam case</th>
<th>Hostage case</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Game design</strong></td>
<td>Scavenger game</td>
<td>Adventure game</td>
<td>Decision game</td>
</tr>
<tr>
<td><strong>Delivery Channel</strong></td>
<td>augmented reality</td>
<td>augmented virtuality</td>
<td>augmented reality</td>
</tr>
<tr>
<td><strong>Pedagogic approach</strong></td>
<td>situated learning</td>
<td>expository learning</td>
<td>learning through decision taking</td>
</tr>
</tbody>
</table>
Streetlearn: ARLearn streetview client

Architecture of the gallery

A visitor in the gallery is proud of her knowledge about the debate over the architecture of this building. She says, that a famous architect state: "Hier wil ik geen discussie over hebben, dit ontwerp keur ik zonder meer goed". But she forgot who it was. Can you help?

From which architect was the quote?

A. 〇 F.J. Dupont
B. 〇 A. Bodon
C. 〇 J.F. Staal

Next
UNHCR Hostage Training

• Hostage taking situation: train employees to handle a hostage taking situation
• Simulate stress through notification framework: many things to handle, little time available
• New events come in: employees need to react in time
• multitask: make it easy for 2 instructors to simulate a hostage taking situation with 18 trainees.
• Different roles with customized content: staff welfare, head of office, security official
Important Message

( ( touch to start ) )
Question

Important Message

After informing your country's Representative, what do you do next?

- Make contact with the hostage takers to find out the demands
- Liaise with other UNHCR staff to establish when, where and why the hostage was taken.
Roles / teams

Head of Office - Security Officer - Staff Welfare

a role is performed by a small group with smartphone.

advance organizer for real drill

take decisions / collaborate
...towards a location-based multi-user game

Game features, patterns:

- resources, play money
- location-based actions and resource collection
- augmented objects
- collaborations, team play, real time chat
- high score, group score
our starting points ...

• Using existing standardized content ECDL and a simulation game as backbone SPITKOM Project
• Thinking about Mobile Game Design Patterns (Davidsson, O., Peitz, J., Björk, S., 2004)
• How to couple game components to real world situations to get third chance learners engaged?
Game Design – Learner View
Game Testing
Figure 8.2. Student reflective practice a. Daily SMS received by students. b. What were your main learning channels today? c. How intense was your learning day? Rate it from 1 to 5.
How will we SPOT?

* Interest and quality in science through inquiry.
* Inquiry learning into today's and the future school environment and everyday living.
* Smart inquiry support mechanism and a diagnostic instrument evaluated in 9 domains and test-beds.
* Build open-source tools and disseminate them into the existing LMS solutions as also via social media.
Thanks.
Questions please.